



Stationary Energy Storage

Tesla Motors

California Public Utilities Commission
Interconnection & Storage Workshop
3 December 2014



- **Tesla has successfully been through the Distribution Rule 21 Interconnection process on existing battery projects in CA.**
- **Now currently going through Transmission interconnection process on several sites in PG&E territory**
- **Current proposal by PG&E for telemetry requirements for these systems is costly**
- **Tesla proposes an alternative, lower-cost approach which has been used by SCE under similar circumstances, which still meets functional requirements.**
- **Tesla further proposes a harmonization of both transmission and distribution interconnection process/approval for CA IOUs.**
- **The CPUC and CAISO have identified that telemetry is a cost barrier in the Energy Storage Roadmap Draft Report (Oct. 8, 2014)**

PG&E Telemetry requirements



1. PG&E's Electric Rule 21 Tariff section J.5 states that if a system is greater than 1 MW; telemetry may be required.
2. Section G1 of PG&E's Transmission Interconnection Handbook requires telemetry for all new generators greater than 1 MW; however, it states that for Load Entities that install generators greater than 1 MW to off-set load, telemetry requirements will be reviewed/evaluated individually.
3. **Summary: Telemetry is not explicitly required in PG&E's literature for battery storage systems > 1MW being used for peak shaving.**
4. Furthermore, telemetry requirements for Non-Export generation interconnections are not differentiated from Export interconnections.
5. Nevertheless, and with reason for system-wide reliability/robustness concerns, PG&E is requiring telemetry.

It should be noted that the telemetry requirement is not due to safety concerns, and all Tesla systems are anti-island (UL 1741) and battery safety (UL 1973) compliant.

Why Telemetry is important to PG&E



1. To have visibility on generation sources even for non-export interconnections.
2. Concern that the algorithm can be changed at any time and therefore operate the system in a different manner that could adversely affect the grid.
3. The battery system masks the true load of the system. PG&E must:
 - 1) Plan for the true load (without the battery) to ensure grid reliability.
 - 2) Plan for the true load for operations planning.
 - 3) Plan for the true load for a black start scenario.
4. For a contingency scenario occurring off-peak (e.g. battery is charging at night), PG&E may request/require the batteries to stop charging. This may come into play in future tariffs or rate schedules if the battery charging is considered non-firm.

Proposed PG&E Telemetry Scope of work/costs



1. *PG&E Responsibilities:* Purchase and install Cooper RTU and SMP IO board, and Modem. This is a pre-wired RTU rack. PG&E ISTS will be responsible for installing and testing the RTU and modems at the Generation facility.
2. *Tesla Responsibilities:* Purchase T1 communication channel for RTU and EMS. This lease line can go to the nearest Front End Processor for RTU and data mapped to EMS. PG&E project team to verify if additional modems are needed for the RTU node location. Provide AC and DC source and associated wires needed for required status points to the RTU.
3. The non-binding IT cost estimate for scope of telemetry related Interconnection Facilities to be completed by PG&E, including material, meetings, Engineering, Technicians and test and travel time is \$170,000 with a potential 8 week lead time.
4. **Total estimated cost including T1 line ~\$250K.**
5. Rule 21 states: Distribution Provider shall only require Telemetering to the extent that **less intrusive and/or more cost effective options for providing the necessary data in real time are not available.** Distribution Provider will report to the Commission or designated authority, on a quarterly basis, the rationale for requiring Telemetering equipment in each instance along with the size and location of the facility.



Tesla Proposed PG&E Telemetry solutions

1. If currently proposed full telemetry scope of work is not reduced or eliminated, Tesla will likely not be able to pursue future projects >1MW connected to transmission and likely connected to distribution if the 1MW rule is assumed by the distribution group; therefore, Tesla requests that PG&E:

- a) Raise Telemetry requirement from > 1MW to >3MWs.
 - a) This figure will at least match the current SGIP limit, and also covers the sizable portion of commercial/industrial installations being pursued

And/Or

- b) Consider using the Interconnection process to document the generation size and use these values to “un-mask” the load, as opposed to real-time data. PG&E has the historical peak load for each facility and the battery storage system size and can simply back this value out to reach a “true” load for the purposes of stability studies and operations planning.

And/Or

- c) Evaluate alternatives to T1 line and consider other options such as internet through a firewall since this data is not related to a protection scheme so the reliability standard can potentially be reduced
 - a) More detail on next slide

Detail to Tesla Proposal (c); Follow example provided by SCE, which modified their approach to transmission interconnection telemetry



SCE Telemetry design BEFORE change

1. Required for all projects greater than 1MW
2. Requirements were based on solution for substation projects, which included the utility provided RTU
3. Cost of these systems were estimated to be \$150k from the utility
 1. Additional cost for the T1 line

SCE Telemetry design AFTER change

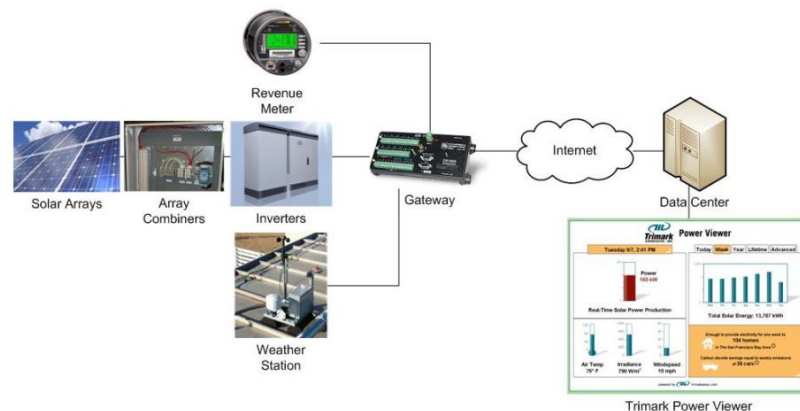
1. SCE developed a “Centralized RTU method” by defining a simplified interface and relying on the installer for data aggregation
2. Data requirements were simplified to kW, KVAR, and generator voltage
3. Standardized Gateway Interface communicating over Modbus TCP
4. Allowed cellular connection with a static IP address (modem and activation completed by customer)
5. Cost of these system are estimated to \$15k from the utility

Examples

The approach Tesla is asking PG&E to evaluate is similar to the monitoring architecture for PDPS for the incentive program (diagram from Trimark included)
Following are links to SCE studies with estimated telemetry costs with their current solution

https://www.sce.com/nrc/openaccess/studyreports/Eastern/WDT440_FAC_StudyReport_2012-12-27.pdf

https://www.sce.com/nrc/openaccess/studyreports/Northern/WDT406_FAC_StudyReport_2013-08-14.pdf





Thank You